OBSERVATIONS ON FOOD AND GROWTH OF *BUFO MELANOSTICTUS* TADPOLE[1]

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(*With a text-figure*)

Studies on the food and its effect on growth in the tadpoles of *Bufo melanostictus* were undertaken to determine food preference in natural condition on the basis of prevalent of food items in guts of naturally occurring tadpoles. The faecal contents of the same tadpoles indicated as to which food items were digested. Tadpoles fed exclusively on spinach, *Spirogyra*, starch and detritus indicated that normal growth occurs when fed on Spinach and *Spirogyra*. Weight gain in the final stage of metamorphosis in *Bufo melanostictus* is remarkable.

To obtain a complete knowledge of the life histories and habits of each species it is necessary to study the relationship between the available food and larval growth rate.

The food and feeding habits of the frog *Rana tigrina* were studied in detail recently by Wadekar (1963), Joshee (1968), Isaac and Rege (1975). While Behura, *et al.* (1971) studied the diet and feeding habits of the common toad *Bufo melanostictus*.

The studies on the role of natural food on larval growth of tadpoles has received little attention in India except for the observations made by Kamat (1962) and Sabnis and Kolhatkar (1977).

This paper describes observations on the food and its effects on the growth of tadpoles of the toad *Bufo melanostictus*.

Materials and method

The material for study was collected at Amravati (M.S.) (20° 56′ N. 77° 47′ E.) Breeding of *Bufo melanostictus* occurs from July to September and about 8,000 eggs are laid in long spiral strings, the diameter of the spiral strings is about 1.4 to 1.5 mm. Each egg measures about 1 to 1.3 mm. in diameter.

To study food preference and dietary components, data were obtained from gut and faecal analysis under microscope.

About 200 eggs were collected and kept in the laboratory for development. A set of twentyfive tadpoles were fed on different diets such as Starch, Spinach, Spirogyra and Detritus.

At intervals five tadpoles were collected from experimental sets as well as from Natural Pond for comparative growth studies. They were preserved in 10% formalin and their length and weights were recorded. Atmospheric and water temperatures were also recorded.

Observations and discussion

The toad *Bufo melanostictus* is very common in ponds, puddles and tanks at Amravati.

Data on gut contents given in Table 1 reveals variations in dietary components at different growth stages. The apparent preference of food items is as follows:-

Eudorina > *Cosmarium* > Watermites >

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TABLE 1

DATA ON PERCENTAGE OCCURRENCE OF FOOD ITEMS IN THE GUTS OF TADPOLES OF *Bufo melanostictus*. (Number—25 per stage)

Intestinal Contents	Prehind limb stage	Hind limb stage	Fore & Hind limb stage
Desmid	71.4	100	100
Diatom	85.7	100	100
Eudorina	100	100	85.7
Opalina	—	—	100
Spirogyra	14.2	57.1	14.2
Ulothrix	85.7	85.7	28.5
Euglena	57.1	71.5	57.1
Seemedesmus	71.4	14.2	14.2
Cosmerium	100	100	—
Watermites	100	—	—
Navicula	71.4	—	28.5
Closterium	—	85.7	—
Pleurococcus	100	—	—

Pleurococcus > Diatom > Desmid > *Closterium* > *Ulothrix* > *Euglena* > *Navicula* > *Spirogyra* > *Seemedesmus*.

The study of excreta revealed that they were able to digest *Spirogyra* and Spinach. The Diatoms, spores of *Eudorina,* and zoospores of *Spirogyra* remained unchanged in excreta. The *Eudorina,* starch granules, xylem and Phloem vessels were partially affected.

The time taken for the metamorphosis varies when fed on different food items (Table 2). It appears that on certain diets they metamorphosed successfully under laboratory conditions. The tadpoles fed on *Spirogyra* metamorphosed in 2 months and 11 days and those fed on Spinach metamorphosed in 2 months and 15 days, while in nature they metamorphosed in 2 months and 6 days.

The weight gain percentage by tadpoles fed on different food items and their percentage of successful metamorphosis is given in Table 3. The maximum increase in their average body weight 31.86%, was when there were fed on Spinach, though the gain of weight by them showed considerable variations at different growth stages.

During the entire period of successful metamorphosis of *Spirogyra* and Spinach fed tadpoles, the tadpoles which were fed on starch, detritus remained in prehind limb stage only.

It is also interesting to note that under laboratory condition tadpoles metamorphosed successfully when fed on *Spirogyra;* but their average body weights at different stages were half that of Spinach fed tadpoles (Table 3).

Sabnis and Kolhatkar (1978) observed that tadpoles of frog *Rana cyanophlyctis* fed on *Spirogyra* showed maximum increase in their average body weight, i.e. 74 per cent. But in the present observations, tadpoles feeding on *Spirogyra* showed increase in average body weight, i.e. 29.36 per cent.

In conclusion it may be pointed out that simple analysis of gut contents of tadpoles does not give clear idea of its food habits. Kamat (1962) studied the gut contents of

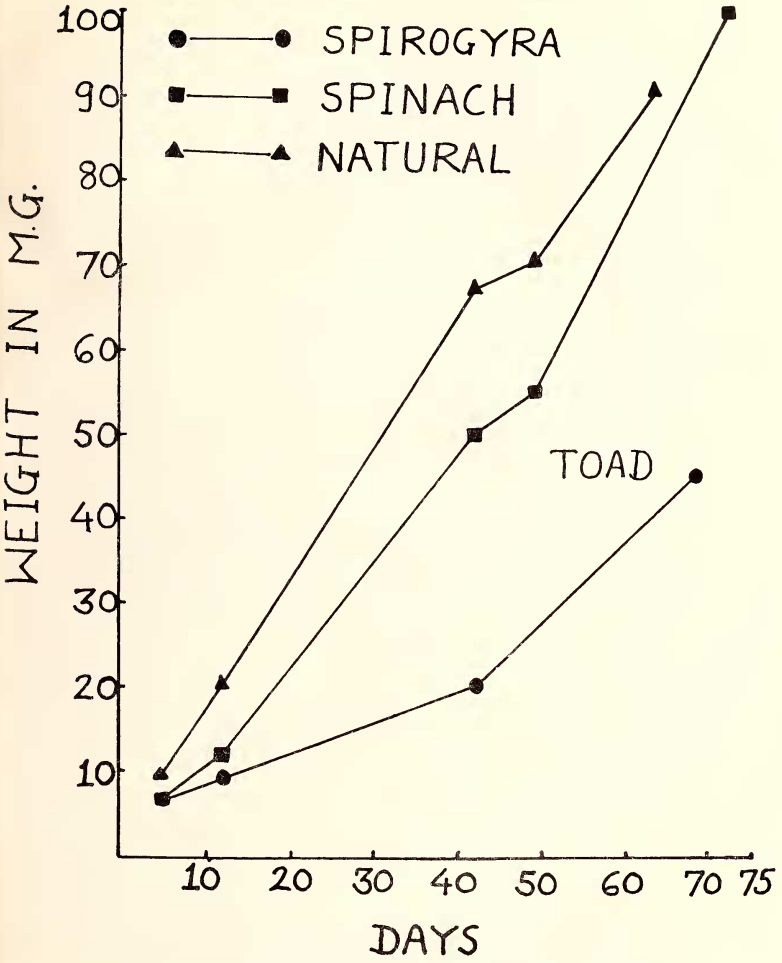

Fig. 1. Shows the comparative growth of *Bufo melanostictus* tadpoles fed on different diets.

TABLE 2

DATA ON GROWTH OF *Bufo melanostictus* TADPOLES (EXPRESSED AS MEAN ± S.E.) (For 5 tadpoles per stage)

Date	Spirogyra fed			Spinach fed			Naturally fed		
	Length in m.m. ± S.E.	Weight in mg. ± S.E.	Temp. °C.	Length in mm. ± S.E.	Weight in mg. ± S.E.	Temp. °C.	Length in m.m. ± S.E.	Weight in m.m. ± S.E.	Temp. °C.
	29th July '77—Egg spawn & Hatched Tadpole:—0 hour								
5-8-77	7± .46	7± .81	27°C.	10±1.25	7± .53	27°C.	7± .74	9± .93	27°C.
12-8-77	8± .81	9±1.06	29°C.	11± .79	12± .93	29°C.	10±1.06	20± .93	30°C.
12-9-77	10± .57	20±1.04	27°C.	16± .93	50± .93	27°C.	21±1.11	67±2.95	27°C.
19-9-77	12±1.41	27±1.74	27°C.	18± .93	55±1.99	27°C.	22±1.58	70± .60	29°C.
	Metamorphosed Toad								
3-10-77	—	—	—	—	—	—	10± .61	90±1.27	28°C.
8-10-77	9±1.23	45±2.04	27°C.	—	—	—	—	—	—
12-10-77	—	—	—	12±1.63	100±1.22	28°C.			

TABLE 3

SHOWS BODY WEIGHT GAIN BY TADPOLES OF *Bufo melanostictus* FED ON DIFFERENT DIETS AND PERCENTAGE OF SUCCESSFUL METAMORPHOSIS

Food item	Number of Tadpoles	Average body weight gain percentage for				Percentage of Metamorphosis
		Pre hind limb stage	Hind limb stage	Hind & fore limb stage	Average	
Spirogyra	25	22.2%	25.9%	40%	29.36%	20%
Spinach	25	41.6%	9 %	45%	31.86%	32%
Starch	25	10 %	—	—	—	0%
Detritus	25	20 %	—	—	—	0%

tadpoles and algae of small ponds and came to the conclusion that tadpoles do not feed on all available algae. In 1941 Rugh states, "the anura do better on food wih green colour while Urodela do better on living moving food such as Daphnia".

Sabnis and Kolhatkar (1978) observed in *Rana cyanophlyctis* decrease in body weight in the final stage of metamorphosis, i.e. after shedding of the tail. No such decrease in body weight was observed in the present investigation. On the contrary in the tadpoles of *Bufo melanostictus* a progressive increase in weight was maintained throughout the process of, metamorphosis (Fig. 1). This disparity may be either due to the comparatively bigger size of the tail in *Rana cyanophlyctis* or it may be due to a better tolerance of the change in feeding habit from herbivorous to insectivorous feeding in *Bufo melanostictus*.

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